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FOREST PRODUCTS LABORATORY

In cooperation with the University of Wisconsin

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**COSTS OF PLAIN AND QUARTER-
SAWING SOUTHERN WHITE OAK**

By R. D. GARVER
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and
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Associate Engineer

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COSTS OF PLAIN AND QUARTER-SAWING SOUTHERN WHITE OAK

By

R. D. Garver; Senior Forester
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Figures obtained during a recent study of southern hardwoods by the Forest Products Laboratory and the Southern Forest Experiment Station make it possible to compare the costs of plain and quarter-sawing white oak. White oak logs were studied at seven mills located in Arkansas, Tennessee, and Louisiana, so that the results should be fairly representative of the region. Methods of quarter-sawing varied from full quartering to splitting the log, turning the halves down, and sawing through and through without turning. All logs that yielded 70 percent No. 1 Common and Better and 20 percent Firsts and Seconds were divided into plain and quartered groups. The time consumed in milling these logs and the resulting grade yields are shown in Table 1.

The 23-inch diameter class represents average results for the group. Based on overrun figures, quarter-sawing yields 12 percent less lumber per thousand feet of logs than plain sawing. For logs smaller than 23 inches in diameter the difference is less because quartering is not carried out so fully, and for larger logs the difference is greater because more edging and trimming are necessary in order to hold the lumber to grade and produce the maximum amount of quartered material. Probably the main reason for the difference in lumber recovery between the two methods of sawing is the necessity of sawing quartered lumber thicker than plain sawn. For example, $\frac{4}{4}$ plain sawn lumber is usually cut $\frac{1}{8}$ inch full, whereas quartered lumber of the same class is cut $\frac{1}{4}$ inch full. This factor alone could account for about 10 percent less yield from the quartered logs. Compared with plain sawing, however, a part of this loss is offset by less footage reduction due to shrinkage in width and less remanufacturing loss, because the tendency to cup, warp, and honeycomb is much lower in the quartered lumber. On the other hand, quartered lumber requires a longer seasoning period than plain sawn lumber.

Milling costs and other costs dependent upon headsaw output are nearly twice as high when quarter-sawing as when plain sawing. For example, Table 1 shows that 16.6 minutes are required to quarter saw one thousand feet of 23-inch logs and only 9.2 minutes to plain saw the same amount.

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Table 1.--Results of plain and quarter-sawing southern white oak¹

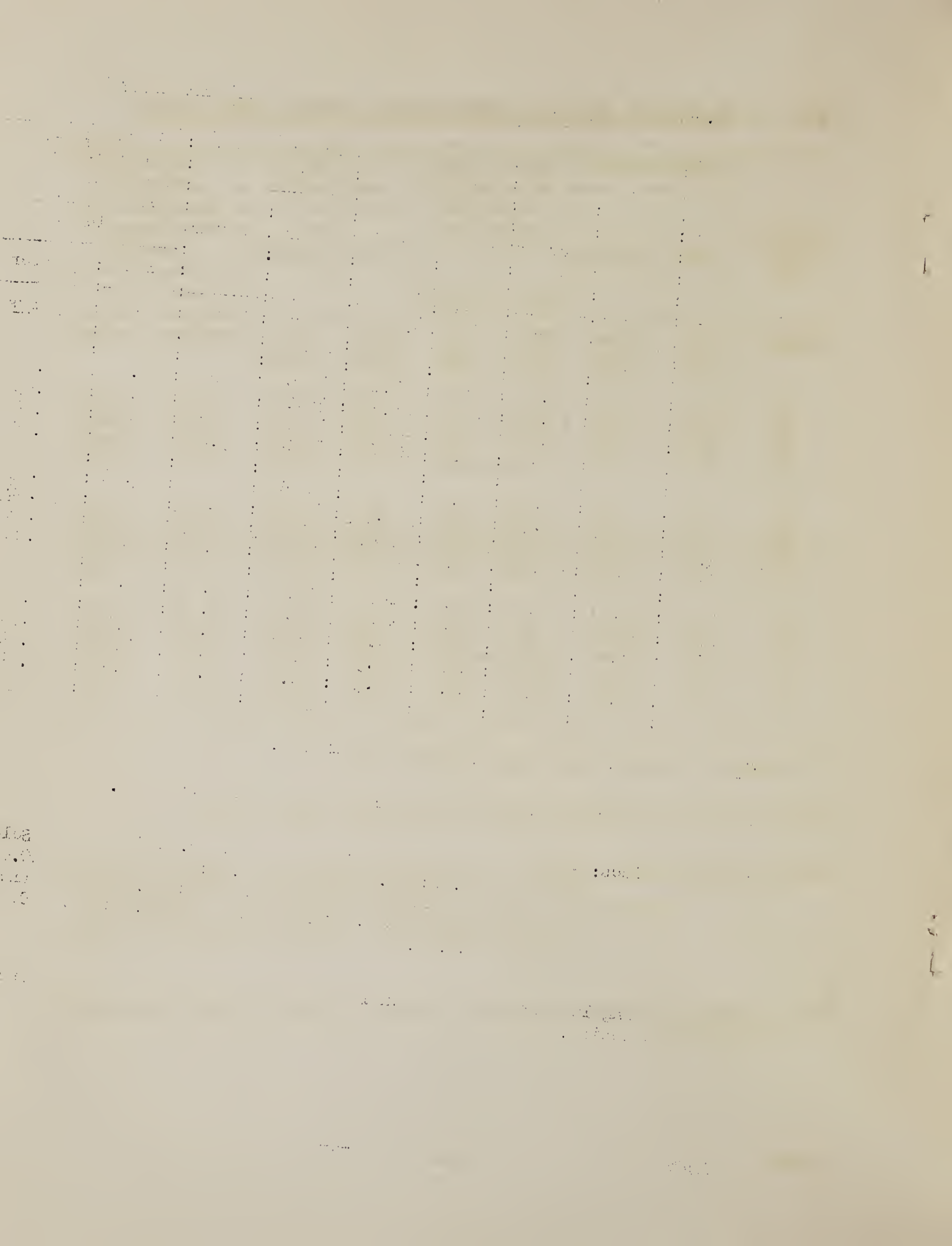
Diameter inside bark	: Net overrun ²		: Milling time		: No. 1 Common		: Value of dry	
	:-----		: per thousand		: and Better		: lumber ³ per	
	:		: board feet		:-----		: thousand board	
	:		: log scale		:		: feet log scale	
	Plain	Quarter	:-----		Plain	Quarter	: of logs ⁴	
	:	:	:		:	:	:-----	
	:	:	Plain	Quarter	:	:	Plain	Quarter
Inches	Per-	Per-	Min-	Min-	Per-	Per-	Dollars	Dollars
	cent	cent	utes	utes	cent	cent	:	:
17	25.5	20.5	12.6	27.1	76.0	93.0	35.92	49.35
18	20.5	15.0	10.8	25.3	76.0	93.0	34.49	47.09
19	16.0	10.0	10.4	23.6	76.0	93.0	33.20	45.04
20	11.5	5.0	9.5	22.0	76.0	93.0	31.91	43.00
21	8.0	0.0	9.2	20.5	76.5	93.0	30.91	40.95
22	5.0	- 5.0	8.9	18.5	76.5	93.0	30.05	38.90
23	2.0	-10.0	9.2	16.6	77.0	93.0	29.20	36.88
24	0.0	-14.0	9.0	15.5	77.5	93.0	28.62	35.22
25	-1.0	-18.0	9.4	14.4	78.0	93.0	28.33	33.58
26	-2.0	-21.0	9.8	13.4	79.0	93.0	28.04	32.34
27	-3.0	-22.0	10.2	12.9	80.0	93.0	27.76	31.94
28	-4.0	-23.0	10.6	12.3	81.0	93.0	27.48	31.54
29	-4.0	-23.0	10.6	12.3	82.0	93.0	27.48	31.54

¹Includes cow, forked leaf, post, and bur oak.

²Based on Scribner Decimal C log rule and green lumber tally.

³Lumber prices: Plain - Firsts and Seconds \$45.00; No. 1 Common and Selects \$28.00; No. 2 Common \$18.00; No. 3 Common \$10.00.
Quartered - Firsts and Seconds \$59.00; No. 1 Common and Selects \$35.00; No. 2 Common \$22.00; No. 3 Common \$10.00.

⁴After making 10 percent reduction in value to cover shrinkage and degrade in seasoning.



The 23-inch quartered logs yielded 93 percent No. 1 Common and Better and the plain sawn logs only 77 percent. Most of this spread is no doubt due to quarter-sawing, but some might result from the fact that the quartered logs may have been slightly higher in quality than the plain sawn logs, although it should be borne in mind that all logs in the comparison were those graded to yield 70 percent No. 1 and 20 percent Firsts and Seconds. Since quartered white oak in the upper grades is priced from 25 to 50 percent higher than plain sawn material of comparable quality, quartering looks like good business and it is. The loss in raw material and increased cost of production, however, must be taken into account in arriving at the net advantage. The last 2 columns in Table 1 show the value of the dry lumber for one thousand feet of logs when sawed by each method. The greater overrun for the plain sawn logs tends to reduce the value spread between the two classes. At the median of 23 inches the difference is \$7.66 in favor of the quartered logs. This figure is based on the lumber prices shown on the table. The green chain tally indicated that about three-fourths of the lumber from the quartered logs in the upper grades showed figure and the prices have been weighted accordingly.

Using a mill charge of 21 cents per minute, which is an actual cost figure obtained from a representative mill operating at the present time, quarter-sawing 23-inch logs costs about \$1.50 more per thousand than plain sawing. Fixed overhead costs could easily increase another \$2 on account of reduced mill output, making a total cost of \$3.50. Subtract this from the price advantage of \$7.66 per thousand shown for the 23-inch quartered logs and a balance of \$4.16 remains.

